

Appl. No.: 09/966,970
Amdt. dated 12/16/2004
Reply to Office action of July 23, 2004

REMARKS/ARGUMENTS

Applicant would like to thank the Examiner for the thorough review of the present application. Based upon the amendments and the following remarks, Applicants respectfully request reconsideration of the present application and allowance of the pending claims.

The Present Invention

The invention provides for an imaging device, such as bar code reader and associated methods for substantially simultaneously capturing image data and image display update. The invention implements multiple buffers, such as first and second buffers (i.e., dual or double buffers) that are capable of capturing an image in one buffer while a second buffer displays the image on an associated imaging device display. Once the second buffer displays the image, another image will be captured to the second buffer while the first buffer displays its stored image to the display. This process continues iteratively and may include more than two buffers. In addition to capturing and displaying the image the device and methods will typically provide for the image to be enhanced and/or reformatted prior to display. Thus the methods and devices of the present invention provide for overall efficiency in the use of the device, in that the imaging device and method provide the capability to capture and display every frame that the imager processes. In addition, the invention is able to efficiently display a quality image and reformat the image into a size compatible for small display sizes. Such a device benefits from real-time aiming, capture and display of image data.

Amendments to the Claims

Independent Claims 1, 7 and 15 have been amended to specifically limit the claim to image devices that include an image enhancer or the step of enhancing the first-in-time image data after capture to the first image capture buffer. As will be discussed below, we believe that

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by more accurately defining and limiting the image device to one that includes an image enhancer distinguishes the present invention from the teachings of the Rao publication. Enhancing of the image prior to display further clarifies one of the novel features of the present invention, which is real-time capture and display of *image data*.

New Claims

New independent claims 28, 33 and 46 have been added to more precisely claim the present invention.

Claim 28 defines an imaging device according to the invention and for the reasons stated below the Applicant believes that the claim is distinguishable from the teachings of the Rao publication.

Claim 33 defines a portable data acquisition device that includes a bar code reader, according to the invention. For the reasons stated below the Applicant believes that the claim is distinguishable from the teachings of the Rao publication.

Claim 46 defines a method for capturing and displaying images in an imaging bar code reader device, according to the invention. For the reasons stated below the Applicant believes that the claim is distinguishable from the teachings of the Rao publication.

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The Office Action

The Examiner has rejected Claims 1-27. Claims 1-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over prior art disclosed in the present application in view of International Patent Publication Number WO 97/06523, issued to Rao et al. Specifically, the Examiner states that Figure 1 of the present invention combined with the Rao publication teach all of the elements of Claim 1:

An imaging device for simultaneous image capture and image display updating, the device comprising:

an imager (*Figure 1, element 20*) for capturing image data upon aiming the imager at an image;

a central processing unit (*Figure 1, element 30*) that is in communication with the imager and issues commands to capture image data;

a direct memory access module (*Figure 1, element 40*) in communication with the imager and the CPU that executes the commands to capture image data; and

a memory module (*Figure 1, element 60*) in communication with the CPU and the DMA module, the memory module including a first image capture buffer, accessible to the CPU, that temporarily stores first-in-time captured image data prior to displaying first-in-time image data and a second image capture buffer, accessible to the CPU, that temporarily stores second-in-time captured image data prior to displaying second-in-time image data (*Rao, Figure 1, buffers 110 and 111 and page 15, first full paragraph*).

The Rao Publication Does Not Teach or Suggest an Image Enhancer or an Image Reformatter

The Rao publication is concerned with the capture and display of video data. The central processing unit (101) of the Rao teaching provides for the graphical data and provides no

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processing benefit to the video data. As such, the video data is not enhanced and/or reformatted prior to display.

The present invention and, more specifically, claims 1 and 15 require that the device and method include an image enhancer or the step of image enhancing. Likewise, dependent claims 5 and 12 further limit the invention by the inclusion of a reformatter or the step of reformatting. Enhancement provides for a more visible image by providing necessary contrast and sharpness to the image. Reformatting of the image allows the image to be re-sized to accommodate displays that are smaller in format than the captured images. Processing such as enhancement and reformatter can be performed on the images with impacting the efficiency of the overall refresh rate because of the efficiency of the multiple buffering operation of the present invention.

Additionally, enhancing the image in combination with a double buffer scheme may provide for update rate improvement. In a single buffer environment, an imaging scanner captures an image upon demand from the CPU, enhances the image, and paints the image on the display. The image refresh rate would be at least as long as the sum of the time to capture the image, the time the CPU spends enhancing the image, and the time the CPU spends painting the image. However, in the present invention, the double buffer scheme allows for the CPU to enhance and paint while the DMA captures another image. As long as the enhance and paint time is less than the capture time, the update rate would be equivalent to the length of time required to capture an image. This would eliminate the impact that enhancing the image has on the update rate.

Since the Rao publication does not teach or suggest enhancement or reformatting of image data, the Applicant believes that independent claims 1 and 15, which require an enhancer or enhancing and dependent claims 5 and 12, which require a reformatter or reformatting are clearly distinguishable and, thus, patentable.

Claims 2-14 and 16-28 are dependent claims that depend from Claims 1 and 15. These claims add further limitations to the independent claims. Therefore, since the Applicant believes that Claims 1 and 15 are patentable, in view of the amendments and the remarks above, the dependent claims must also be deemed patentable, as a matter of law.

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The Rao Publication Provides No Teaching or Suggestion of an Imaging Device that includes a Barcode Reader

The Rao publication is concerned with teaching video capture and display. Therefore, the Rao publication provides no teaching or suggestion of an imaging device that includes a barcode reader.

Newly added independent claims 33 and 46 specifically limit the invention to imaging devices that include a barcode reader that is in communication with the processing unit. The invention is specifically relevant and beneficial to barcode reading devices because the user of such devices will typically require efficient capture and display of images as a means of adding efficiency to their overall task. This is especially true when the barcode reader device is used in an inventory environment or in a shipping environment in which the user will require the device to aim, capture and display images as efficiently as possible.

Since the Rao publication does not teach or suggest a barcode reader in connection with a multiple buffer process, the Applicant believes that independent claims 33 and 46, which require a bar code reader are clearly distinguishable and, thus, patentable.

Claims 34-45 and 47-52 are dependent claims that depend from Claims 33 and 46. These claims add further limitations to the independent claims. Therefore, since the Applicant believes that Claims 33 and 46 are patentable, in view of the amendments and the remarks above, the dependent claims must also be deemed patentable, as a matter of law.

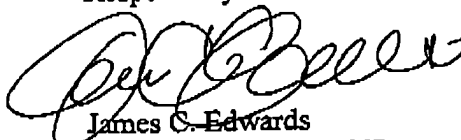
Conclusion

In view of the proposed amended claims and the remarks submitted above, it is respectfully submitted that the present claims are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicant's undersigned attorney to resolve any remaining issues in order to expedite examination of the present invention.

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It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

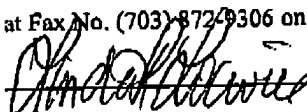
Respectfully submitted,


James C. Edwards
Registration No. 44,667

Customer No. 00826
ALSTON & BIRD LLP
Bank of America Plaza
101 South Tryon Street, Suite 4000
Charlotte, NC 28280-4000
Tel Charlotte Office (704) 444-1000
Fax Charlotte Office (704) 444-1111

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